

What is claimed is:

1. A magnetic shunt assembly for an apparatus, the apparatus
2 including an optical assembly, a gap near the optical assembly, a stage, and a
mover assembly that moves the stage in the gap, the mover assembly
4 generating a magnetic field, the magnetic shunt assembly comprising:

6 a first magnetic shunt positioned approximately between the
optical assembly and the mover assembly, the first magnetic shunt being
made of a magnetic permeable material, the first magnetic shunt
8 providing a low magnetic reluctance path that redirects at least a portion
of the magnetic field away from the gap.

2. The magnetic shunt assembly of claim 1 wherein the first
2 magnetic shunt is spaced apart from the stage.

3. The magnetic shunt assembly of claim 1 wherein the first
2 magnetic shunt is spaced apart from the optical assembly.

4. The magnetic shunt assembly of claim 1 wherein the first
2 magnetic shunt is substantially tubular shaped and substantially encircles at
least a portion of the optical assembly.

5. The magnetic shunt assembly of claim 1 wherein the first
2 magnetic shunt is generally flat plate shaped.

6. The magnetic shunt assembly of claim 1 wherein the first
2 magnetic shunt has a substantially "L" shaped cross-section.

7. The magnetic shunt assembly of claim 1 wherein the first
2 magnetic shunt redirects at least approximately 10 percent of the magnetic field
away from the gap.

8. The magnetic shunt assembly of claim 1 wherein the first magnetic shunt redirects the at least approximately 50 percent of the magnetic field away from the gap.

9. The magnetic shunt assembly of claim 1 further comprising a second magnetic shunt positioned approximately between the optical assembly and the mover assembly, the second magnetic shunt being made of a magnetically permeable material.

10. The magnetic shunt assembly of claim 9 wherein the first magnetic shunt and the second magnetic shunt are positioned on opposite sides of the stage.

11. The magnetic shunt assembly of claim 9 wherein the first magnetic shunt and the second magnetic shunt are positioned on opposite sides of the optical assembly.

12. The magnetic shunt assembly of claim 1 wherein the first magnetic shunt does not move relative to the optical assembly during operation of the stage assembly.

13. A stage assembly comprising a stage, a mover assembly, a container that encloses the stage and the magnetic shunt assembly of claim 1, wherein the first magnetic shunt is coupled to the container.

14. The stage assembly of claim 13 wherein the magnetic shunt assembly includes at least one container magnetic shunt that is positioned along a wall of the container.

15. An apparatus including the magnetic shunt assembly of claim 1 and an illumination source.

16. An object on which an image has been formed with the apparatus
2 of claim 15.

17. A semiconductor wafer on which an image has been formed with
2 the exposure apparatus of claim 15.

18. A stage assembly for moving a device for an apparatus, the
2 apparatus including an optical assembly, a gap near the optical assembly, the
stage assembly comprising:
4 a stage that retains the device;
a mover assembly that moves the stage in the gap, the mover
6 assembly generating a magnetic field; and
a first magnetic shunt positioned approximately between the
8 optical assembly and the mover assembly, the first magnetic shunt being
spaced apart from the stage, the first magnetic shunt being made of a
10 magnetic permeable material, the first magnetic shunt providing a low
magnetic reluctance path that redirects at least a portion of the magnetic
12 field away from the gap.

19. The stage assembly of claim 18 wherein the first magnetic shunt
2 is spaced apart from the optical assembly.

20. The stage assembly of claim 18 wherein the first magnetic shunt
2 is substantially tubular shaped and substantially encircles at least a portion of
the optical assembly.

21. The stage assembly of claim 18 wherein the first magnetic shunt
2 is generally flat plate shaped.

22. The stage assembly of claim 18 wherein the first magnetic shunt
2 has a substantially "L" shaped cross-section.

23. The stage assembly of claim 18 wherein the first magnetic shunt
2 redirects at least approximately 50 percent of the magnetic field away from the
gap.

24. The stage assembly of claim 18 wherein the first magnetic shunt
2 redirects the at least approximately 50 percent of the magnetic field away from
the gap.

25. The stage assembly of claim 18 further comprising a second
2 magnetic shunt positioned approximately between the optical assembly and the
mover assembly, the second magnetic shunt being made of a magnetically
4 permeable material.

26. The stage assembly of claim 25 wherein the first magnetic shunt
2 and the second magnetic shunt are positioned on opposite sides of the stage.

27. The stage assembly of claim 25 wherein the first magnetic shunt
2 and the second magnetic shunt are positioned on opposite sides of the optical
assembly.

28. The stage assembly of claim 18 wherein the first magnetic shunt
2 does not move relative to the optical assembly during operation of the stage
assembly.

29. The stage assembly of claim 18 further comprising a container
2 that encloses the stage, wherein the first magnetic shunt is coupled to the
container.

30. The stage assembly of claim 18 wherein the magnetic shunt
2 assembly includes at least one container magnetic shunt that is positioned
along a wall of the container.

2 31. An exposure apparatus including the magnetic shunt assembly of claim 18 and an illumination source.

2 32. An object on which an image has been formed with the exposure apparatus of claim 31.

2 33. A semiconductor wafer on which an image has been formed with the exposure apparatus of claim 31.

2 34. A method for reducing stray magnetic fields in a gap of an apparatus, the apparatus including an optical assembly, a stage, and a mover assembly that moves the stage in the gap, the mover assembly generating a magnetic field, the method comprising the step of:

4 positioning a first magnetic shunt positioned approximately
6 between the optical assembly and the mover assembly, the first magnetic shunt being made of a magnetic permeable material, the first
8 magnetic shunt providing a low magnetic reluctance path that redirects at least a portion of the magnetic field away from the gap.

2 35. The method of claim 34 wherein the step of positioning the first magnetic shunt includes the step of spacing the first magnetic shunt apart from the stage.

2 37. The method of claim 34 wherein the step of positioning the first magnetic shunt includes the step of spacing the first magnetic shunt apart from the optical assembly.

2 38. The method of claim 34 wherein the step of positioning the first magnetic shunt includes the step of providing a first magnetic shunt that is substantially tubular shaped, the first magnetic shunt substantially encircling at
4 least a portion of the optical assembly.

39. The method of claim 34 wherein the step of positioning the first
2 magnetic shunt includes the step of providing a first magnetic shunt that is
substantially flat plate shaped.

40. The method of claim 34 wherein the step of positioning the first
2 magnetic shunt includes the step of providing a first magnetic shunt that has a
substantially "L" shaped cross-section.

41. The method of claim 34 further comprising the step of positioning
2 a second magnetic shunt approximately between the optical assembly and the
mover assembly, the second magnetic shunt being made of a magnetically
4 permeable material.

42. The method of claim 41 wherein the step of positioning the
2 second magnetic shunt includes the step of positioning the second magnetic
shunt on the opposite side of the stage from the first magnetic shunt.

43. The method of claim 41 wherein the step of positioning the
2 second magnetic shunt includes the step of positioning the second magnetic
shunt on the opposite side of the optical assembly from the first magnetic
4 shunt.

44. A method for making an exposure apparatus that transfers a
2 pattern from a first object onto a second object, the method comprising the
steps of:

4 providing an illumination system that illuminates the first object
supported by a stage to form the image on the second object, the first
6 object being positioned in a gap; and

reducing stray magnetic fields in the gap with the method of claim
8 34.

45. A method for making a device utilizing the exposure apparatus
2 made by the method of claim 44.

46. A method for exposing a semiconductor wafer utilizing the
2 exposure apparatus made by the method of claim 44.

47. A method for making a stage assembly that moves a device for
2 an apparatus, the apparatus including an optical assembly, and a gap near the
optical assembly, the method comprising the steps of:
4 providing a stage that retains the device;
moving the stage in the gap with a mover assembly, the mover
6 assembly generating a magnetic field; and
positioning a first magnetic shunt approximately between the
8 optical assembly and the mover assembly, the first magnetic shunt being
spaced apart from the stage, the first magnetic shunt being made of a
10 magnetic permeable material, the first magnetic shunt providing a low
magnetic reluctance path that redirects at least a portion of the magnetic
12 field away from the gap.

48. The method of claim 47 wherein the step of positioning the first
2 magnetic shunt includes the step of spacing the first magnetic shunt apart from
the optical assembly.

49. The method of claim 47 wherein the step of positioning the first
2 magnetic shunt includes the step of providing a first magnetic shunt that is
substantially tubular shaped, the first magnetic shunt substantially encircling at
4 least a portion of the optical assembly.

50. The method of claim 47 wherein the step of positioning the first
2 magnetic shunt includes the step of providing a first magnetic shunt that is
substantially flat plate shaped.

51. The method of claim 47 wherein the step of positioning the first
2. magnetic shunt includes the step of providing a first magnetic shunt that has a
substantially "L" shaped cross-section.

52. The method of claim 47 further comprising the step of positioning
2. a second magnetic shunt approximately between the optical assembly and the
mover assembly, the second magnetic shunt being made of a magnetically
4 permeable material.

53. The method of claim 52 wherein the step of positioning the
2 second magnetic shunt includes the step of positioning the second magnetic
shunt on the opposite side of the stage from the first magnetic shunt.

54. The method of claim 52 wherein the step of positioning the
2 second magnetic shunt includes the step of positioning the second magnetic
shunt on the opposite side of the optical assembly from the first magnetic
4 shunt.

55. The method of claim 47 further comprising the step of enclosing
2 the stage with a container and the step of securing the first magnetic shunt to
the container.

56. A method for making an exposure apparatus that transfers a
2 pattern from a first object onto a second object, the method comprising the
steps of:

providing an illumination system that illuminates the device; and
moving the device with a stage assembly made by the method of

claim

57. A method for making a device utilizing the exposure apparatus
2 made by the method of claim 56.

58. A method for exposing a semiconductor wafer utilizing the
2 exposure apparatus made by the method of claim 56.